

# **A Green Energy Project (CDM) with Co-Generation.**

BY

FUEL POWER  
TECHNOLOGIES,  
MEERUT, U.P., INDIA.

# VISION

- Contribute our part in liberating the World's dependence on fossil fuels for energy needs.
- Endeavor to lower the energy costs through cost effective means- Gasification.
- To be able to contribute towards Economic growth of the World at large.
- To eliminate Wastes, a menace for Govts. Of all the Countries, by promoting Municipal Solid Waste to Electricity Projects, a cheapest source for Electricity generation.

# Fuel Power Technologies

## DEDICATED TEAM (1/2)

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**RAJIV MOHAN**

**CEO  
Commercial & Tech.**

- Founder & Promoter. A Graduate in Laws and a Graduation in Bio-Sciences.
- Rich Corporate experience of three decades at various top positions in Production, Planning, Administration, Personnel Management, Business Development & Commercial.
- Vast knowledge of Gasification and a pioneer in the development of this technology.

**DEVENDRA PAL**

**COO  
Design & Operations**

- B.Tech. & formerly a Naval Engineer with Indian Navy for over **two decades** & has a rich & on hands experience with an in depth exposure to HFO/ Natural Gas/ Diesel Engines up to 65000HP (50MW), Turbines- Both Gas & Steam & Gasification system.
- GM at various Corporate Power Plants for over a decade.
- Vast knowledge of Design & Engine modificatrions

**RISHABH MOHAN  
M.B.A. FINANCE**

- Masters in Business Administration with specialization in Finance & Strategies.
- Has been trained at M/s Nomura Services Ltd., a Japanese Financial Giant.

# Fuel Power Technologies

DEDICATED TEAM (2/2)

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**Capt.. SANDEEP  
AGARWAL**

**Elect. & Electronic**

- B.tech. Electrical & Electronics. Design of Alternators, Automation and PLC controls.
- Formerly a Captain with Signals & controls of Indian Army.

**RATAN LAL  
DHIMAN**

**Fabrication**

- Over 20 years of Fabrication experience of Various Industrial Equipments



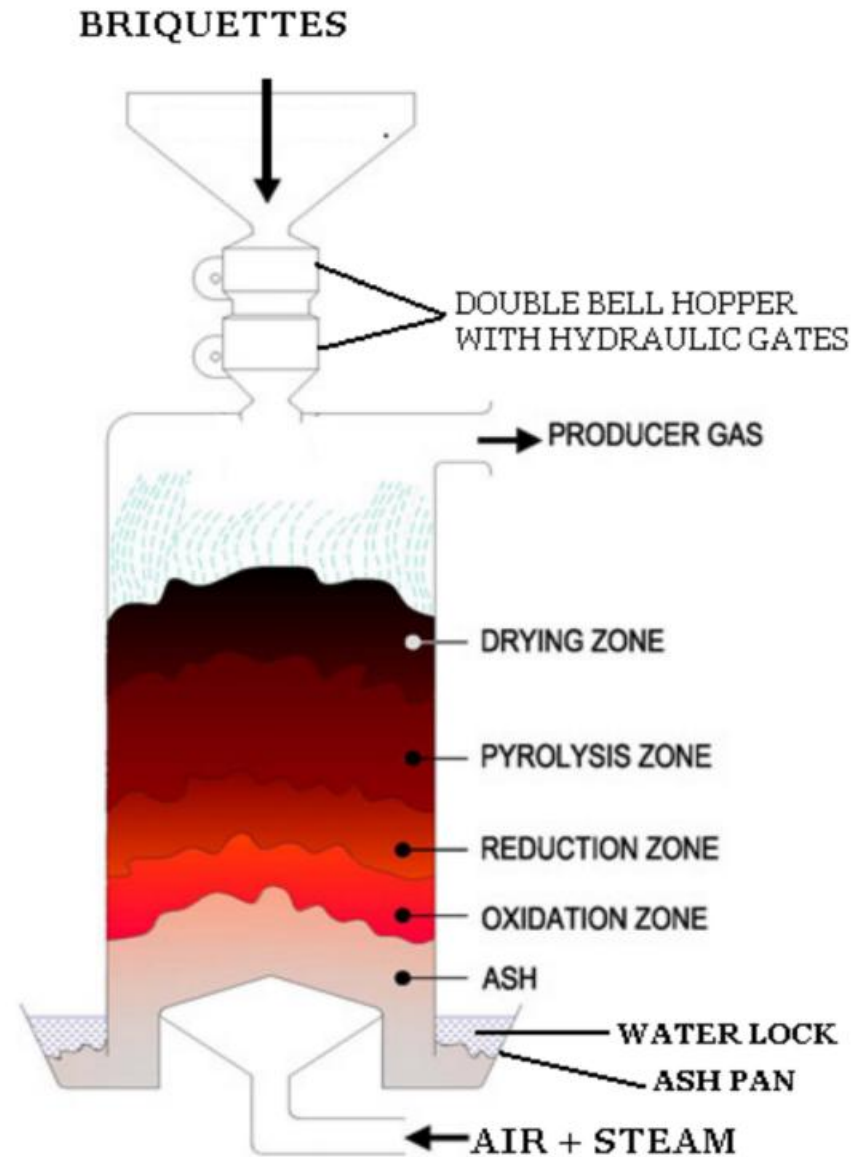
# Some Eye Openers

- **Developed the New Generation, Multi-Fuel Gasification system having 'Up-draft semi-Fluidised Circulating Bed technology with Direct & In-direct oxidation.'** Cal. Val. of Producer Gas is  $>2000$  KCal./nm<sup>3</sup>.
- **We manufacture up to 4MW capacity as a single unit.**
- **We exclusively modify Natural gas Gen-sets for Producer Gas / Syn-Gas mode of operation.**

# Concept of Gasification

- **Gasification-** A Thermo-Chemical process of cracking of fuel or Hydro-Carbons at high temp. of 1100 deg.C in the minimal presence of O<sub>2</sub> that converts solid waste, Biomass or coal into a Gaseous fuel called Producer Gas / Syn-gas.
- **Indirect Oxidation-** Steam is co-generated & injected with air in Gasif. Chamber. At high temp. of 1100 deg. C, it dissociates to form more CO, & H<sub>2</sub> to increase the calorific value of Producer Gas.
- **Multi-Fuel design viz.-** (All can be used)
  - SOLID WASTE-** Tires, Plastics, Paper, Rags, etc.
  - BIOMASS-** Rice Husk, Saw dust, Coco shells, Corn cobs, Groundnut Husk, Agri. waste etc.
  - COAL-** Lignite, Anthracite, Pet coke etc.

# Gasification Zones



## Process Steps

- Sized fuel is lifted and delivered to the storage hopper above reactor assembly by skip-hoist / Bucket-Elevator / Belt conveyer.
- From the storage hopper, fuel is fed to the reactor through double-bell cone fuel feeding system to prevent leakage of Gas.
- Feed stock travels downwards and gets dried and preheated.
- Thereafter it undergoes thermal cracking at high temp. of 1100deg.C through different thermo-chemical processes to produce Producer/Syn- Gas coming out from the top of the Reactor at a temp. of close to 400deg.C.
- On coming out of the reactor, the Producer gas is passed through two stage Venturi Cyclones where the gas is cooled and cleaned of particulate impurities.



## Contd.....

- Then, the Producer gas is passed through multi-stage Pipe shower filters for cooling to ambient temperature and further washing of particulate impurities.
- This Producer gas at ambient temp. is injected into TAR & Dust separators for segregation of TAR, which is received as a by-product.
- This clean gas is passed through de-moisturizer for drying.
- This dry & ultra-clean gas is monitored for dryness by Humidity analyzer and for composition by On-line Gas analyzer.
- This Ultra-clean and dry Gas at the outlet through Gas control valves is ready for injection into a Kiln for Ceramic Industry or a Generating set modified by us for Producer gas mode of operation.

## Contd.....

- **Dioxins, Furans & Tar is 0.006mg/nm<sup>3</sup>. Accepted EPA norms are up to 0.1mg/nm<sup>3</sup>.**
- **SPM content:Max.20mg/nm<sup>3</sup>. Accepted norms: 50mg/nm<sup>3</sup>**
- **Tar with a Cal.Val. of 7,400Kcal/kg., available as by-product, on centrifuging, fetches 65% price of FO, or used for heating-Furnaces or Kilns, or can be upgraded to Gasoline. Tar is upto 2% with Biomass, 4% from MSW, & upto 8% with Anthracite as feedstock.**
- **One on-line Gas analyzer with NDIR technology along with sampling system, connected to 4 to 20 milli.amps PLC & air & gas controller, is fixed at Engine exhaust end to check emission of toxic CO & CH<sub>4</sub> in flue gases.**

## Contd.....

- **No Effluents i.e. No Drainage. Water evaporates while cooling of Syn-gas & excess is re-circulated.**
- **No emissions from the complete Plant.**
- **Electricity for self consumption: <20KW/MW.**
- **Water requirement of 2000 lts. / MW / day.**
- **Carbon Credits Eligibility- 5000 / MW /year & can be traded Internationally. Value varies.**

# Power Generation

- Option for Dual fuel on request:
  - (a) 100% Producer Gas mode operation.
  - (b) If Production of Gas falls short, then, auto conversion to Dual Fuel (Syn Gas + Nat. Gas) mode without tripping of the Electricity.
  - (c) If Producer Gas is Shut down, then, auto conversion to Natural gas mode without tripping of the system.

# Thermal Use- Boilers / Kilns / Furnaces

- Automated control for supply of Gas to burner with respect to Boiler temperature. On reaching the required temperature, the Gas supply will be automatically reduced, fuel supply and air blower will also be regulated and as such, saves fuel.
- Temperature variation of +/- 2deg.C.
- Great Economic relevance.

## Diff.: Updraft & Downdraft Gasifiers

- Down draft Gasifiers have Low thermal efficiency of  $<55\%$  with high self power consumption & bio-char as waste. **Bio-char** has 20% energy residue & is not good for land fill or for use in Furnace. Prod. gas has a very low CV of **950Kcal/m<sup>3</sup>**. Capacity of single unit larger than 400KW is not viable.
- In our Updraft Gasifiers, **energy less ashes is the only Waste** with efficiency  $>98\%$ , Self power consumption is  $<20\text{KW/ MW}$ . Prod. Gas has high CV of  **$>2000 \text{ Kcal/ m}^3$** . A Single unit can be manufactured up to 4MW. Larger Capacities – in multiples of 4 MW each.

# Gasification Vs Incineration

- **Gasification:** An eco-friendly technology, accepted all over World. Contributes in reduction of Green House Gases.
- **‘Incineration’:** Simple burning of fuel. All heat not utilized. Heat & CO<sub>2</sub> release in atmosphere increase GHG emission & thus Global Warming. In Gasification, all heat is utilized.
- Incineration of Plastics and other wastes produce chlorine gas from the phenolic contents in waste and reacts with air moisture to form Hydro-chloric acid or - **Acid Rain**. Not in Gasification
- EPA norms for phenolic toxins- Dioxins & Furans is **0.1mg/nm<sup>3</sup>**. By Gasification, it is **0.006mg/nm<sup>3</sup>** & by combustion, it is **2mg/nm<sup>3</sup>, much beyond limits of toxicity**.

## Contd.....

- **Incineration used widely in Coal / Bagasse fired Power Plants for STG, CHP Plants.**
- **A Big Myth- CO<sub>2</sub> produced by Incineration is neutralised by CO<sub>2</sub> to be used by growing similar quantity of Biomass. As of now, Incineration is polluting the atmosphere.**
- **Gasification is Waste → Energy + Ash where as Incineration is Waste → Energy + Ash + Pollution.**



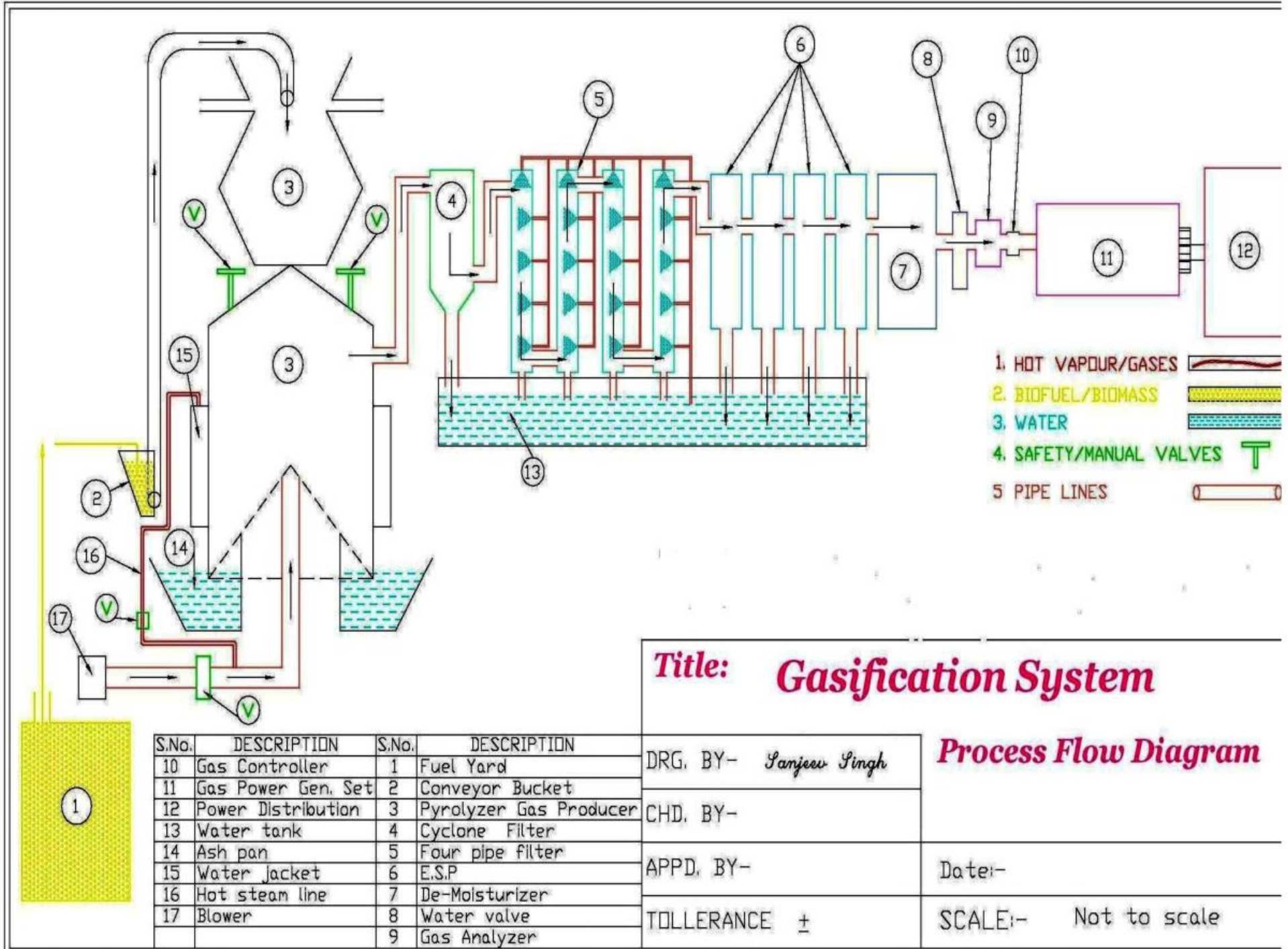
## Contd.....

- Gasification is Clean Development Mechanism in truest terms.
- CO<sub>2</sub> produced on Gasification of 100kg. Coal = 26 Cu. mt.
- CO<sub>2</sub> produced on Incineration / Burning of 100Kg. Coal = 185 Cu. mt.
- CO<sub>2</sub> produced on Gasification of 100kg. Wood = 20 cu. mt.
- CO<sub>2</sub> produced on Incineration / Burning of 100Kg. wood = 139 cu.mt.

# Co-Generation

- **Waste Heat Recovery Boiler fixed at the Exhaust end of the Engine provides 1 ton of Steam per MW per hour at 7Kg. Pressure suitable for generation of 100KW Elect. with a low pressure steam turbine.**
- **Syn-Gas can directly be used to heat Furnaces, Kilns, Heaters, Industrial dryers for a thermal application.**





**Title: Gasification System**

**Process Flow Diagram**

S.No.	DESCRIPTION	S.No.	DESCRIPTION
10	Gas Controller	1	Fuel Yard
11	Gas Power Gen. Set	2	Conveyor Bucket
12	Power Distribution	3	Pyrolyzer Gas Producer
13	Water tank	4	Cyclone Filter
14	Ash pan	5	Four pipe filter
15	Water jacket	6	E.S.P
16	Hot steam line	7	De-Moisturizer
17	Blower	8	Water valve
		9	Gas Analyzer

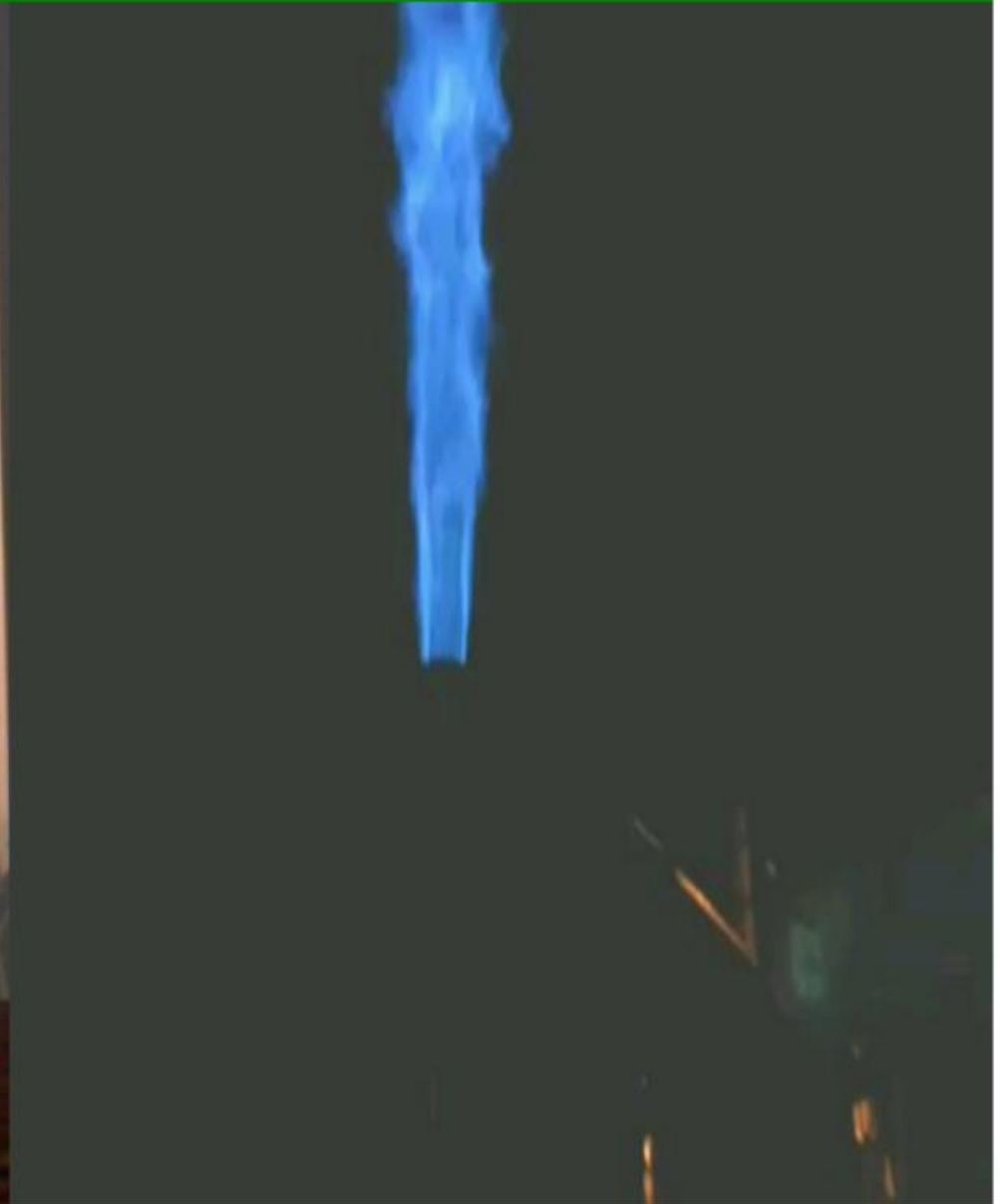
DRG. BY- *Sanjesh Singh*  
 CHD. BY-  
 APPD. BY-  
 TOLLERANCE ±

Date:-  
 SCALE:- Not to scale

**Gas Filtration Switch Off**



**Gas Filtration Switched On**





# Waste to Electricity Projects.....

Sky is the limit

■ **THANK**

**YOU**